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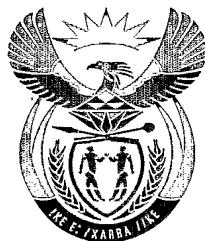
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PCT/ZA2003/00132

13 OCT 2006

## Setifikaat

PATENTKANTOOR

DEPARTMENT VAN HANDERL  
NYWERHEID

## Certificate

PATENT OFFICE

DEPARTMENT OF TRADE  
AND INDUSTRY

Hiermee word gesetifiseer dat  
This is to certify that

PCT/ZA2003/00132

13 OCT 2006

The attached documents are true copies of the Form P2, P1, P6 and a Provisional Specification of a South African Patent application No. 2002/09262

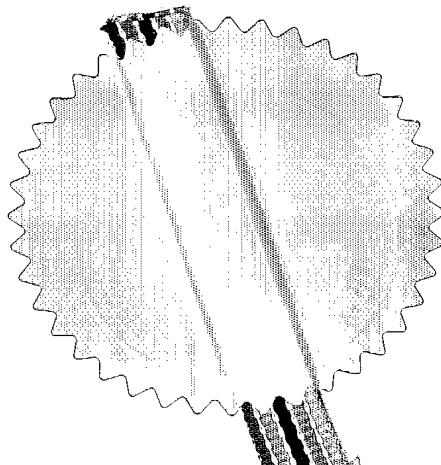
In the name of : **INNOVATIVE MET PRODUCTCTS (PTY) LTD**

Filed on the : **14<sup>th</sup> NOVEMBER 2002**

Entitled : **SEPARATING VESSEL**

Getekken te **PRETORIA** in die Republiek van Suid-Afrika, hierdie  
Signed at in the Republic of South Africa, this **12<sup>th</sup>** dag van  
October 2006

Registrateur van Patente  
Registrar of Patents



REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

## REGISTER OF PATENTS

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INTERNATIONAL CLASSIFICATION		LODGING DATE : COMPLETE		GRANTED DATE	
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FULL NAME(S) OF APPLICANT(S) / PATENTEE(S)					
71	INNOVATIVE MET PRODUCTS (PTY) LIMITED				
APPLICANTS SUBSTITUTED :					
71					
ASSIGNEE(S)					
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PRIORITY CLAIMED		COUNTRY		NUMBER	
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TITLE OF INVENTION					
54	SEPARATING VESSEL				
ADDRESS OF APPLICANT(S) / PATENTEE(S)					
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ADDRESS FOR SERVICE					REF
74	D M Kisch Inc, 66 Wierda Road East, Wierda Valley, SANDTON			P25632ZA00	
PATENT OF ADDITION NO.		DATE OF ANY CHANGE			
61					
FRESH APPLICATION BASED ON		DATE OF ANY CHANGE			

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978

APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT  
(Section 30 (1) - Regulation 22)

The grant of a patent is hereby requested by the undermentioned applicant  
on the basis of the present application filed in duplicate.



OFFICIAL APPLICATION NO		
21	01	2002/9262

DMK REFERENCE
P25632ZA00

FULL NAME(S) OF APPLICANT(S)	
71	INNOVATIVE MET PRODUCTS (PTY) LIMITED

ADDRESS(ES) OF APPLICANT(S)	
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TITLE OF INVENTION				
54	SEPARATING VESSEL			
	THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P2 The earliest priority claimed is			
	THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.	21	01	
	THIS APPLICATION IS FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO.	21	01	

THIS APPLICATION IS ACCOMPANIED BY :	
<input checked="" type="checkbox"/> 1a	A single copy of a provisional specification of 10 pages.
<input type="checkbox"/> 1b	Two copies of a complete specification of pages.
<input type="checkbox"/> 2a	Informal drawings of sheets.
<input checked="" type="checkbox"/> 2b	Formal drawings of 4 sheets.
<input type="checkbox"/> 3	Publication particulars and abstract (form P8 in duplicate).
<input type="checkbox"/> 4	A copy of figure of the drawings for the abstract.
<input type="checkbox"/> 5	Assignment of invention (from the inventors) or other evidence of title.
<input type="checkbox"/> 6	Certified priority document(s).
<input type="checkbox"/> 7	Translation of priority document(s).
<input type="checkbox"/> 8	Assignment of priority rights.
<input type="checkbox"/> 9	A copy of form P2 and a specification of S.A. Patent Application.
<input type="checkbox"/> 10	A declaration and power of attorney on form P3.
<input type="checkbox"/> 11	Request for ante-dating on form P4.
<input type="checkbox"/> 12	Request for classification on form P9.
<input type="checkbox"/> 13a	Request for delay of acceptance on form P4.
<input type="checkbox"/> 13b	
	<input type="checkbox"/> 21 <input type="checkbox"/> 01

DATED 14 November 2002

ADDRESS FOR SERVICE	
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The duplicate will be returned to the applicant's address for service as proof of lodging but is not valid unless endorsed with official stamp.

Patent Attorney for Applicant(s)



## REPUBLIC OF SOUTH AFRICA

## PATENTS ACT, 1978

## PROVISIONAL SPECIFICATION

( Section 30 (1) - Regulation 27 )

OFFICIAL APPLICATION NO.		LODGING DATE		DMK REFERENCE
21	1012002/9262	22	14 November 2002	P25632ZA00
FULL NAME(S) OF APPLICANT(S)				
71	INNOVATIVE MET PRODUCTS (PTY) LIMITED			
FULL NAME(S) OF INVENTOR(S)				
72	HOHENSTEIN, Boyne Friedrich			
TITLE OF INVENTION				
54	SEPARATING VESSEL			

**SEPARATING VESSEL****Field of the Invention**

5 THIS invention relates to a separating vessel particularly suitable for, but not limited to, use in mineral sample analysis.

**Background to the Invention**

10 In the field of fire assaying, mineral samples are mixed with a flux in a reaction vessel and fused to form a molten flux and molten collector material which collects a metal to be assayed. In conventional fire assay methods, the flux and collector material are caused to solidify and thereafter separated mechanically.

**15 Object of the Invention**

It is accordingly an object of the present invention to provide a novel separating vessel suitable for separating molten slag from a molten collector material in a

mineral sample analysis method such as a fire assay process.

**Summary of the Invention**

According to the invention a separating vessel suitable for use in a mineral sample analysis method wherein a molten slag is separated from a molten collector material, comprises a container defining an interior cavity for receiving the molten materials, an outlet aperture leading from the interior cavity to the exterior of the container, and a separating surface associated with the outlet aperture which is shaped to cause droplets of flux to be carried along such surface, while droplets of collector material drip off such surface by the force of gravity.

In a preferred arrangement the separating surface is a downwardly directed concave surface. Such concave surface is preferably concentrically arranged relative to the outlet aperture.

15

Further according to the arrangement, the outlet aperture has dimensions such that the collector material passes through the aperture under the force of gravity, while the molten flux material is substantially prevented from passing through the outlet

aperture.

Thus with the above arrangement, the majority of molten flux will be arrested at the outlet aperture, but a small portion which may pass through the outlet aperture, will be separated from the collector material by the separating surface. This could for 5 example take place where the outlet aperture is gradually enlarged through use.

In a preferred arranged the outlet aperture will be disposed at low level in the interior cavity, and a slag outlet will be provided in the container spaced vertically upwardly from the outlet aperture, the arrangement being one wherein molten slag 10 which overlies the collector material in the molten state will drain from the slag outlet during the process of draining the collector material through the outlet aperture. Molten slag which ultimately remains in the separating vessel after removal of the collector material, can be removed from the vessel for example by tilting or inverting the vessel.

15

Also included separately within the scope of the invention is a method of separating molten collector material from molten slag suitable for a mineral sample analysis process comprising the steps of :

providing the separating vessel of the invention;

5 introducing a mixture of molten slag and molten collector material into the vessel whereby the slag settles above the collector material as a result of density differentials;

draining the collector material through the outlet aperture under the force of 10 gravity while the slag is substantially arrested by the outlet aperture;

further separating the collector material from the slag which has passed through the outlet aperture at the separating surface where collector material runs vertically downwardly from the exit of the outlet aperture under the 15 force of gravity while the slag is displaced laterally along the separating surface.

Further according to the invention the method includes the step of draining slag

through the slag outlet. Preferably, slag will drain through the outlet during or prior to draining the collector material through the outlet aperture.

#### Brief Description of the Drawings

5

The invention is further described in the preferred embodiment described hereunder purely by way of example with reference to the accompanying drawings wherein:

Figure 1 is a schematic sectioned elevation of a separating vessel in  
10 accordance with the invention; and

Figures 2 to 4 are schematic sectioned elevations of the separating vessel in  
Figure 1, illustrating various steps in separating a molten  
slag from a molten collector material in fire forming part of  
15 a fire assay process.

#### Detailed Description of Drawings

Referring to the drawings, the invention provides a novel separating vessel 10 for separating molten slag 11 from molten collector material 12 for example in a fire assay process.

- 5 The separating vessel 10 comprises a container having an interior receiving zone 13 for the molten materials 11, 12, as shown in Figure 1.

The vessel 10 of the invention further includes a low level outlet aperture 14 which is of a relatively small diameter, and will permit the collector material 12 to drain 10 through such aperture 14 by gravity, while the molten slag 11 will substantially be prevented from passing through the aperture 14 as a result of the higher viscosity and/or lower density of the molten slag 11.

It is a feature of the invention that a separation surface 15 is provided on the 15 exterior of the container 10 in the zone of the outlet aperture 14, such separation surface 15 being adapted to separate any molten slag 11a which may trickle through the outlet aperture 14, from the molten collector material 12a, Figure 3 and Figure 4.

In the arrangement illustrated, this separating surface 15 is in the form of a concave surface which is concentrically arranged relative to the axis of the outlet aperture 14. It has been found that with the arrangement of the invention, molten slag droplets 11a tend to cling to the concave surface 15, and are carried laterally away from the outlet aperture 14 ultimately to gather at a rim 15a of the concave surface from which they drop downwardly under the force of gravity, Figure 3. This behaviour of the molten slag droplets 11a can be ascribed to the low density of the slag material 11 and/or its surface tension. The collector material 12a, Figure 3, on the other hand having different physical characteristics in respect of density and surface tension tends to pour directly vertically downwardly from the exit of the outlet aperture 14 under the force of gravity.

In the arrangement illustrated, the molten collector material 12a is collected in a collection vessel 17, while the molten slag drops 11a are transported laterally beyond the collection vessel 17 for separate collection.

A further feature of the invention comprises an intermediate outlet 16 for molten

slag 11 in the side wall of the container 10 in a position spaced vertically upwardly from the outlet aperture 14 for collector material 12. The purpose of this intermediate slag outlet 16 is to drain the majority of molten slag 11 from the separating container while the molten collector material 12 is being drained through

5 the outlet aperture 14. The relatively small portion of slag 11 which ultimately remains in the separation vessel 10 after draining of the collector material 12 can thus readily be removed from the container 10 by inversion thereof, or tilting thereof, not shown.

10 Thus in use, for example in a fire assay process for determining the concentration of PGM's (Platinum Group Metals) in an ore sample, such ore sample will be comminuted and mixed with a flux material, and introduced into a reaction vessel. The flux will be caused to fuse to produce a molten slag and a molten collector material such as lead, silver, etc, which acts to collect the PGM's. The molten

15 mixture is then introduced into the separating vessel 10 of the invention in order to separate the molten collector material 12 from the molten slag 11 as described above. In certain cases the separating vessel 10 of the invention could also act as the reaction vessel.

It has been found that with the method described above, sufficient and effective separation of the molten slag 11 and molten collector material 12 can be achieved to enable further analysis of the collector material 12 and entrained PGM's.

5

Doubtless many variations are possible without departing from the principles set out in the consistory clauses. Thus, the separation surface 15 could for example merely comprise a surface which is angled to the vertical in a single plane or in several planes whereby molten slag drops 11a are carried transversely away from outlet 10 duct 14 for separate collection. Alternatively, the separation surface 15 could be could be conical.

Dated this 14 day of November 2002

Patent Attorney / Agent for the Applicant

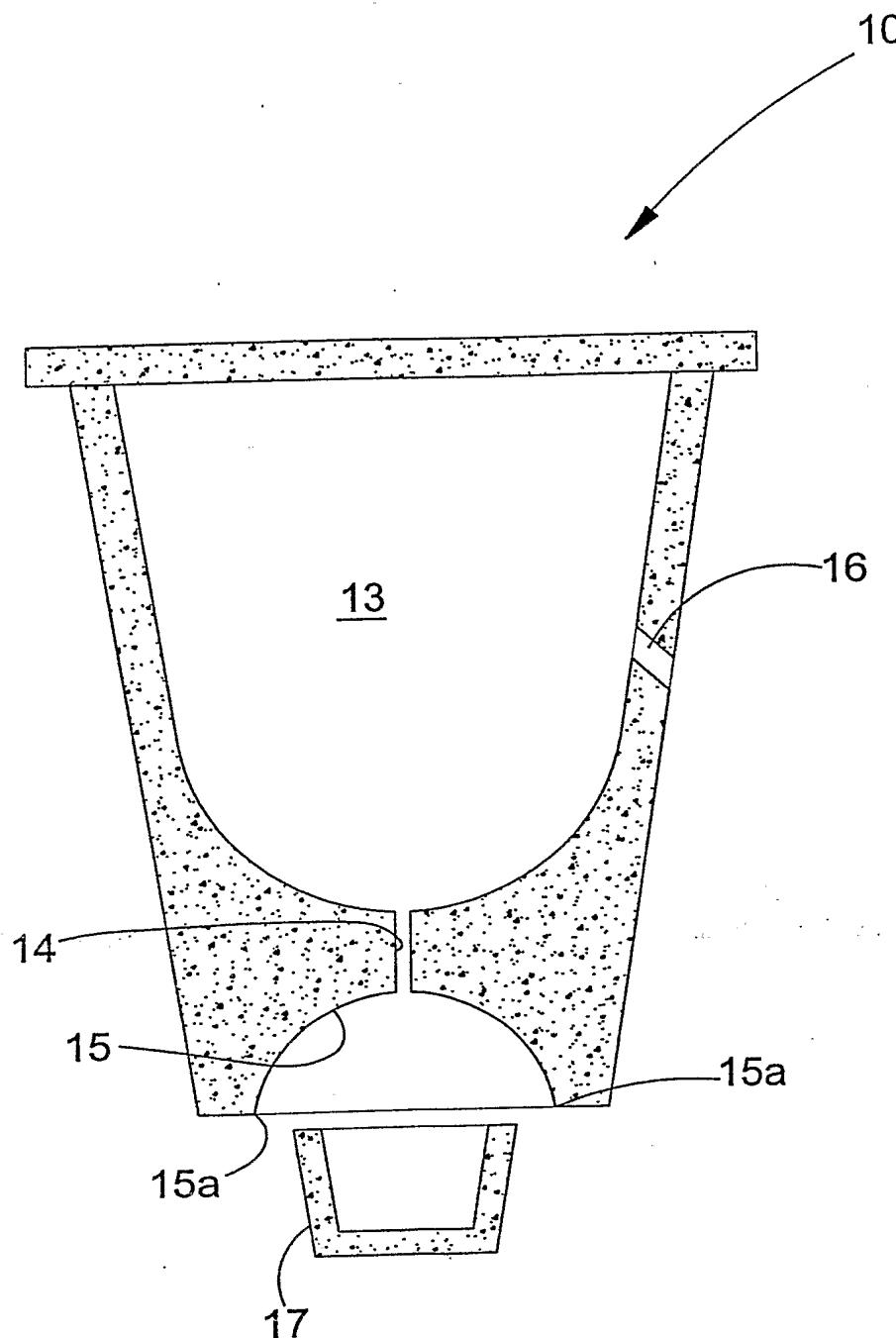


FIGURE 1

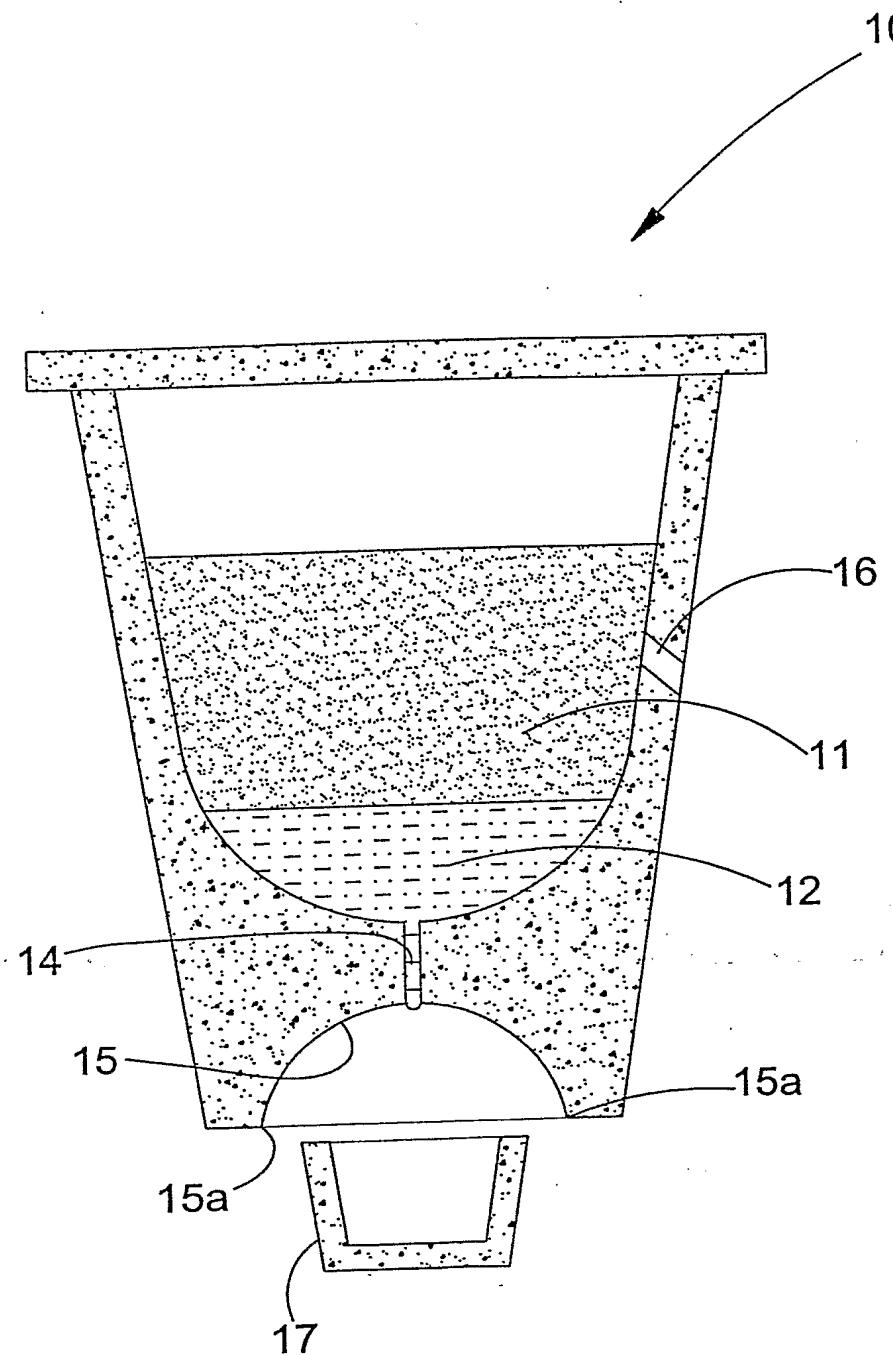


FIGURE 2

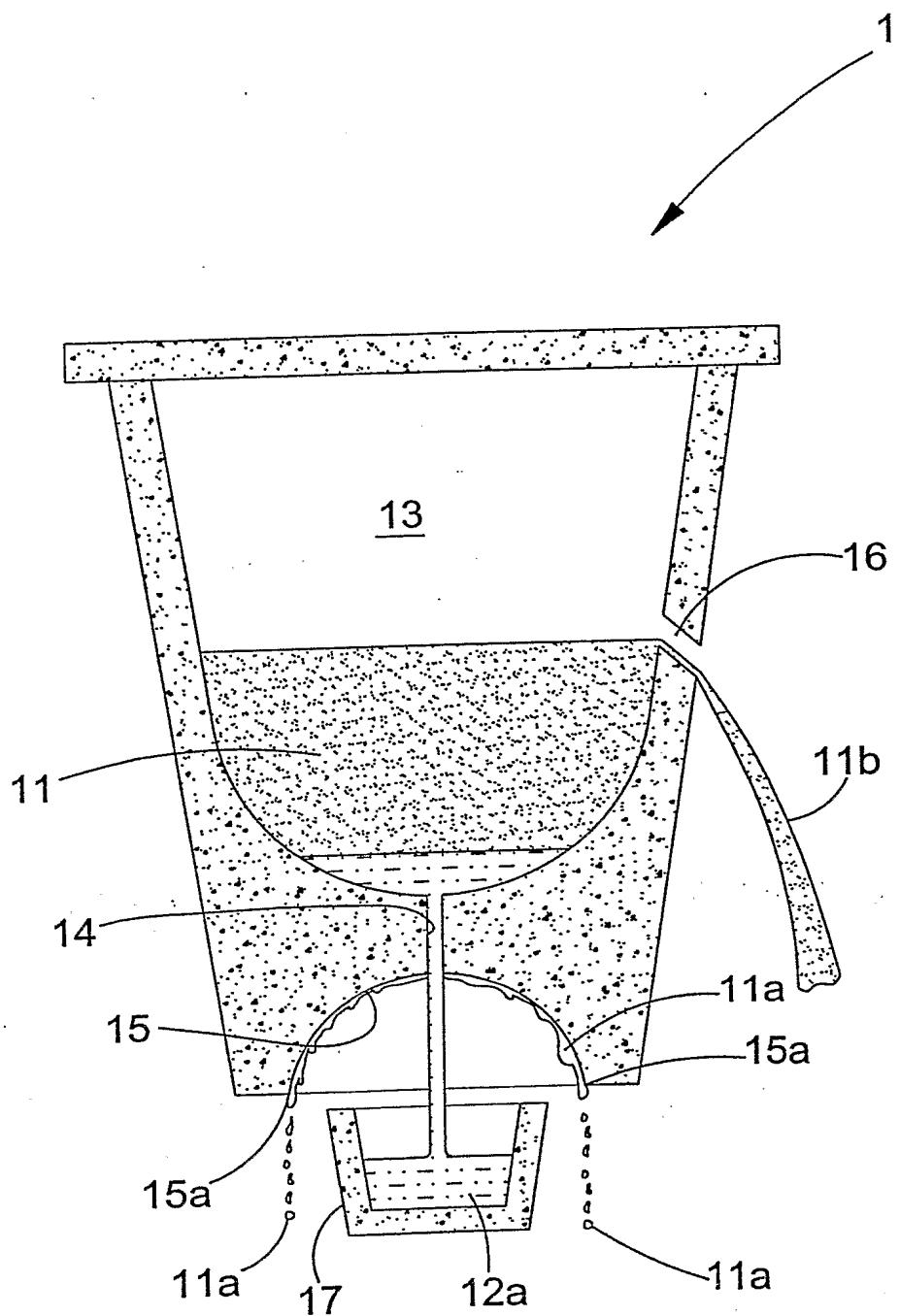


FIGURE 3

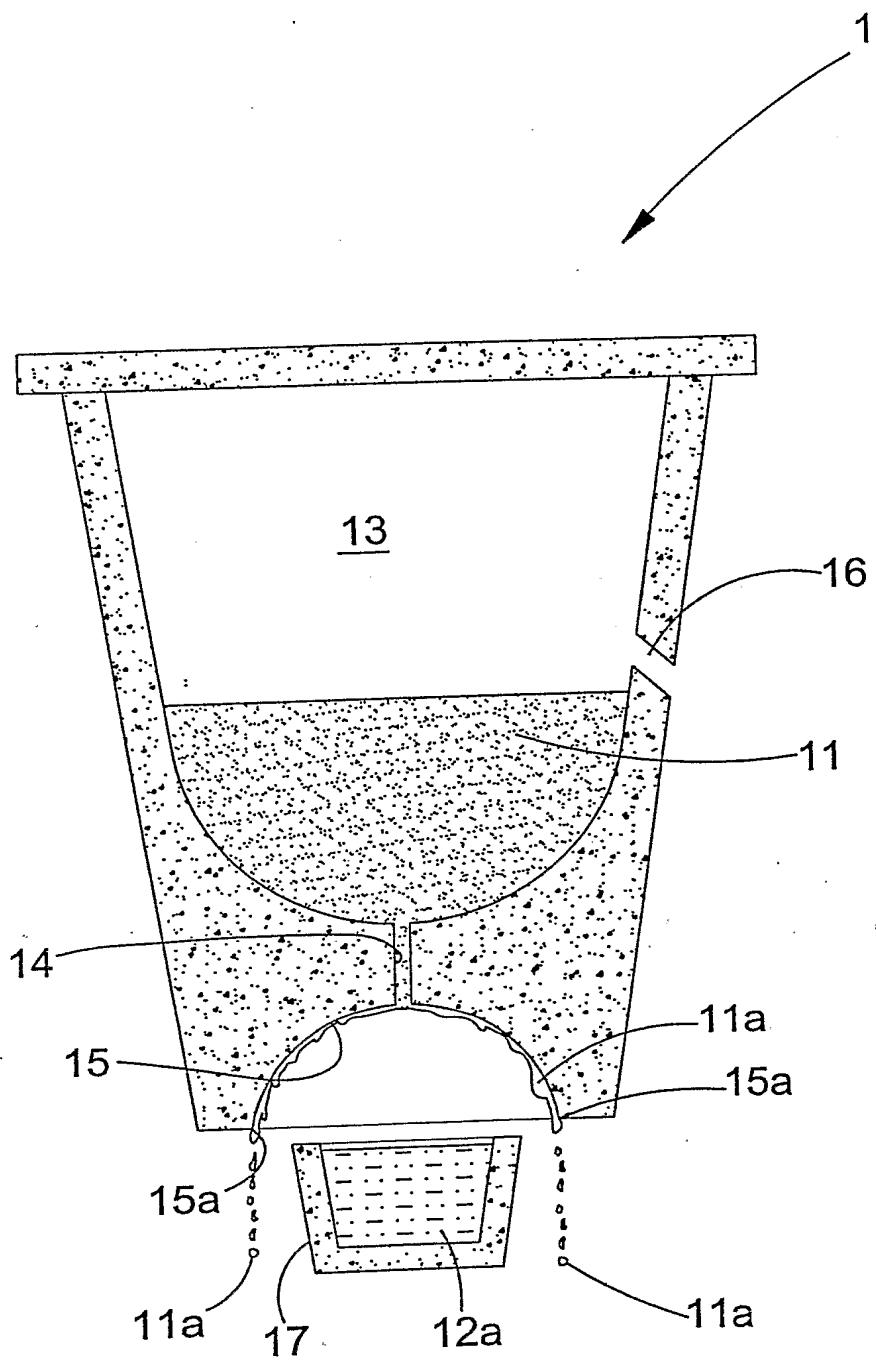


FIGURE 4